April 21, 1936. H. J. HAMMERLY 2,038,105

THERMOSTATIC OVERLOAD SWITCH

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Fig. 1.

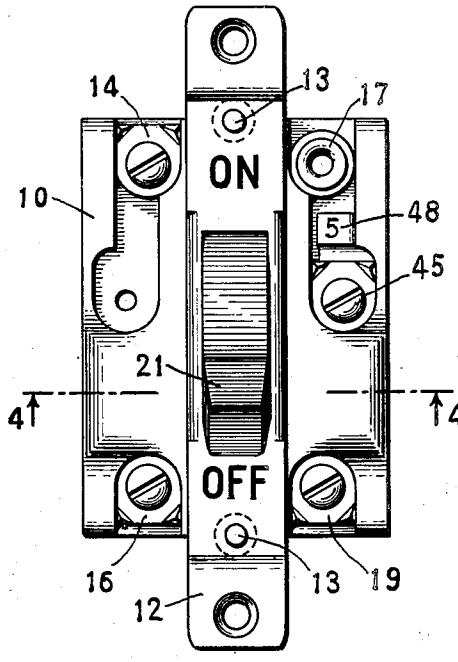


Fig. 2.

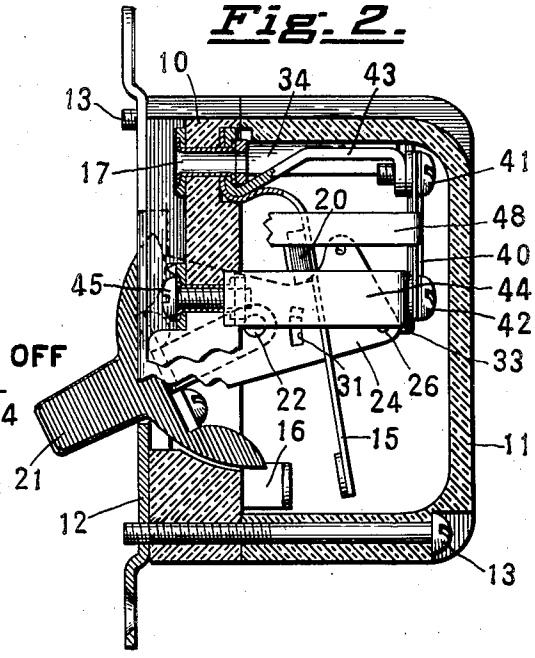


Fig. 3.

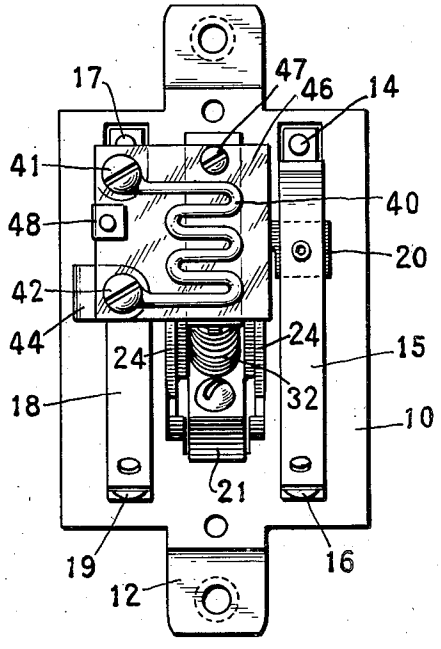
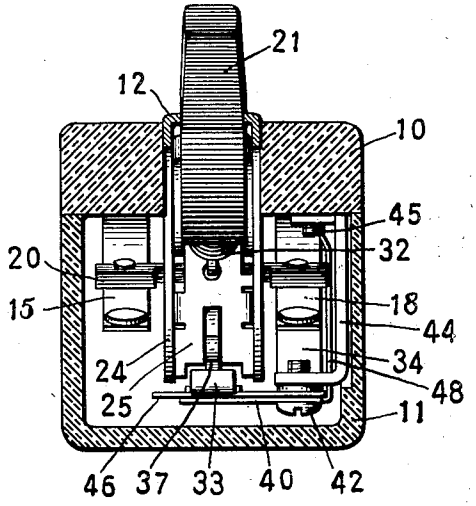


Fig. 4.



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Fig. 5.

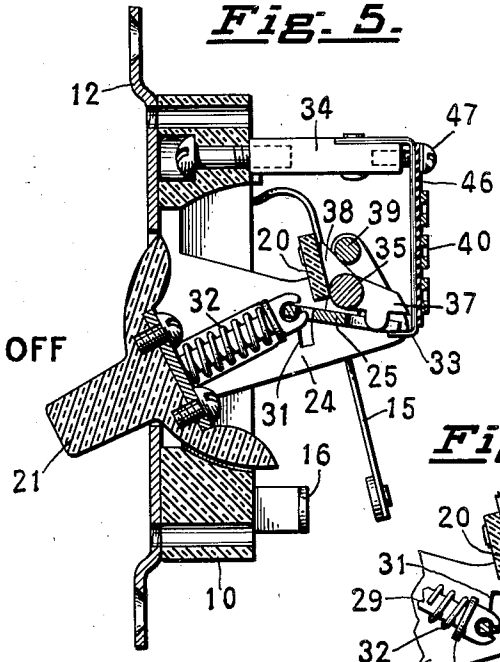


Fig. 6.

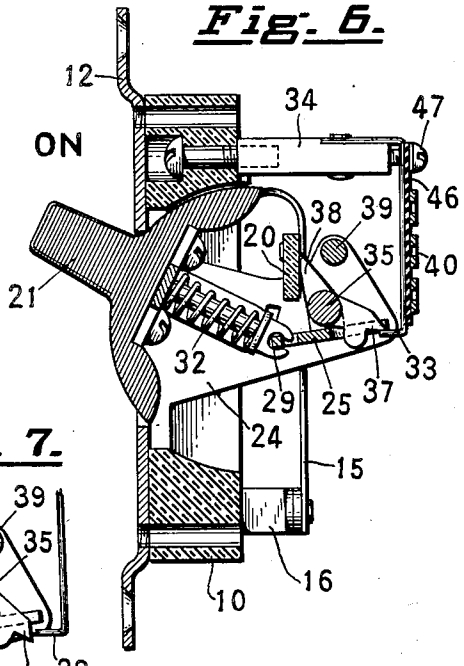


Fig. 7.

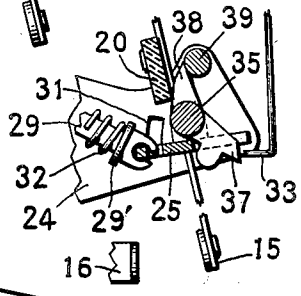
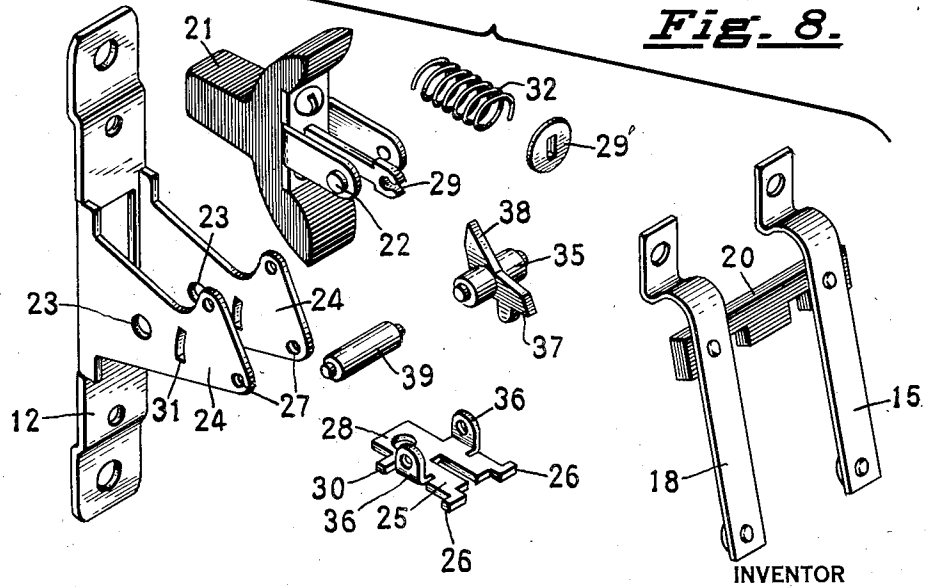


Fig. 8.



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2,038,105

THERMOSTATIC OVERLOAD SWITCH

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Application December 24, 1934, Serial No. 758,913

11 Claims. (Cl. 200—116)

REISSUED

My invention relates particularly to electric switches adapted to be normally manually actuated but which will automatically open the circuit in case of an overload.

One object is to provide an extremely simple and practical construction of the snap action toggle type which is automatically released by the action of a thermostatic strip to open the circuit in case of an overload. The switch is normally actuated to off and on positions by the simple tilting of a finger lever. A bimetallic thermostatic strip in the form of a latch holds the parts when they are moved to the closed circuit position. The removable and renewable heater unit coacts with the thermostatic strip to release the toggle action in case of an overload. The switch may then be reset manually as soon as it is cooled off.

The exact form of embodiment is not vital to the invention.

Fig. 1 shows a front view of one form of construction embodying my invention.

Fig. 2 shows a vertical section and side elevation with the parts in the off or open circuit position.

Fig. 3 is a rear view.

Fig. 4 is a transverse sectional view on the plane of the line 4—4 of Fig. 1.

Fig. 5 is a vertical sectional view on a somewhat different plane from that of Fig. 2 but also showing the parts in the open circuit or off position and omitting the box part of the housing.

Fig. 6 is a similar sectional view showing the parts in the on or closed circuit position.

Fig. 7 is a fragmentary view showing the parts in the position which they occupy when released thermostatically.

Fig. 8 is an exploded perspective view showing parts of the switch mechanism.

The switch shown is of the enclosed snap action type. The housing is made up of the base or front section 10 and the box like portion 11 both formed of insulating material and held together by a number of screws 13 which screw into the face plate 12. The binding post or terminal 14 is electrically connected to the spring switch arm 15, the movable end of which coacts with the stationary contact 16.

The terminal 17 is electrically connected to the spring switch arm 18, the movable end of which is adapted to engage the stationary contact 19.

These two arms 15 and 18 are mechanically connected by an insulating cross bar 20.

The operating lever 21 carries a metal U-shaped member with hinge pins 22 which are pivotally supported in the bearing openings 23 in the side arms 24 of the bracket or frame of which the front plate 12 is a part.

The toggle link 25 has hinge members 26 pivoted in the openings 27 in the inner ends of the arms 24. The end 28 of the toggle member 25 has a hinge-like connection in the end of the slotted bar 29 which loosely slides in the handle 21 in the usual manner. The swinging movement of the lever 25 is limited by the projection 30 which extends into the slot 31 in one of the arms 24 of the frame. The spring 32 is mounted on the slotted bar 29 and presses against the washer 29' so as to snap the lever 25 back and forth as the finger piece 21 is actuated.

The bimetallic thermostatic latch member 33 is supported by the post 34. The catch member 35 is hinged in the lugs 36 which form a part of the toggle member 25. One end 37 of the catch 35 is adapted to coact with the hook of the latch 33 and the other end 38 coacts with the cross bar 20 of the movable switch member. The cross piece 39 serves as an abutment or stop for the finger part 38 of the catch member 35.

The action of the switch under normal load conditions is very much the same as that of a conventional type toggle switch. In other words, when the switch is off or in the open circuit position of Fig. 5 the circuit may be closed by simply lifting the finger piece 21 sufficiently so that the cross piece 28 of the toggle link 25 comes below the center line whereupon the toggle action closes the circuit. The opening of the circuit is effected by moving the finger piece 21 in the reverse direction whereupon the snap action of the toggle takes place aided by the spring action of the arms 15 and 18.

The resistance or heater unit 40 may be formed from a flat stamping or flattened wire formed into a coil or zigzag shape and secured in place by screws 41 and 42. The screw 41 is threaded into one end of the bracket 43 which is connected to the terminal 17. The screw 42 is threaded into the bracket 44 which has the circuit terminal 45 at the front. The plate 46 of mica or other suitable insulating material is interposed between the heater or resistance unit and the thermostatic latch 33.

A screw 47 may be provided for adjusting the position or action of the latch 33. An indicator strip 48 has one end supported by the plate 46 and the other end extended through the base 10 and exposed at the front with a mark indicating the rating of the capacity of the switch.

When the switch is in the closed circuit position as shown in Fig. 6 the latch 33 engages the beveled tip 37 of the catch member and is held there by the spring pressure or bias of the arms 15 and 18 through the cross bar 20 which presses upon the tail 38 of the catch and tends to rotate the catch member clockwise as viewed in Fig. 6.

When the thermostatic latch member is heated by an overload current it warps or bends so that its hook-like tip will be disengaged from the tip 37 of the catch and thus allow the spring arms 15 and 18 to tilt the catch into the position shown in Fig. 7, thus opening the circuit without affecting the toggle action. To reset the switch it is merely necessary to tilt the finger piece 21 from the position of Fig. 6 to the position of Fig. 5 which throws the catch back into the position shown in Fig. 5.

From the foregoing it will be seen that the switch may be actuated manually under normal circumstances in the same manner as any toggle action switch. It will also be seen that under overload conditions the heater unit will cause the thermostatic switch to warp and release the flipper or catch which in turn allows the movable switch members to open the circuit even though the operating handle is held in the on position. The catch or flipper has no spring of its own but its movement is caused by the action of the spring 32 and the spring arms 15 and 18 above described.

One of the important novel features in this present invention is the freely mounted flipper or catch member which requires no spring of its own and functions as a latching or catch member.

It will be further seen that the normal toggle action is wholly independent of the thermostatic action. The resistance heater unit is detachable and can be readily replaced. Obviously the same mechanism may be employed for different capacities by the simple expedient of properly designing the thermostatic latch and the heater unit.

I claim:

1. In a toggle action thermostatic switch, an insulating support, a metal frame carried thereby and having a toggle action device, a freely pivoted catch carried by one part of the toggle action device and a thermostatic latch coacting with the catch.

2. In a toggle action switch, a spring switch arm, a toggle action device including a catch carried by one part of the device and coacting with the spring switch member and a thermostatic latch coacting with said catch.

3. In a toggle action thermostatic switch, a metallic frame, a toggle lever hinged at one end of the frame, a finger piece hinged to the toggle member, a spring for biasing the toggle member, a catch loosely hinged to the toggle member, a spring pressed switch member moved in one direction by the catch and a thermostatic latch coacting with said catch to permit the normal opening and closing of the switch but adapted to release the toggle action in case of an overload.

4. In a thermostatic switch, a toggle action device, a freely pivoted catch carried by one part of the toggle action device and a thermostatic latch coacting with the catch and a spring pressed switch member coacting with said catch.

5. In a toggle action switch, a spring switch arm, a toggle action device including a catch pivoted to one part of the device and coacting with the spring switch arm and a resilient thermostatic latch coacting with said catch.

6. In a toggle action thermostatic switch, a metallic frame, a toggle lever hinged at one end to the frame, a finger piece connected to the toggle member, a spring for biasing the toggle member, a catch hinged to the toggle member, a spring pressed switch member moved in one direction by the catch and a resilient thermostatic latch coacting with said catch and adapted to release the toggle action in case of an overload.

7. An electric switch including a pivoted operating lever, a pivoted toggle member hinged to the operating lever, a catch member hinged to the toggle member, a spring pressed switch member coacting with the catch member and a thermostatic latch normally interposed in the path of the catch member.

8. A snap switch including a stationary contact, a movable contact for coacting therewith and normally biased to the off position, operating mechanism coacting with the movable member and including a finger lever, an oscillating member connected to the finger lever, means pivotally carried by the oscillating member and free to move on occasion of an overload, a thermal element holding said means under normal circuit conditions and a throwing spring coacting with the oscillating member for actuating the same and the said means carried thereby so as to open and close the circuit with a snap action when said finger lever is manually operated and so as to open the circuit with a snap action when the thermal element releases said means.

9. In a snap switch, an insulating support having a passage extending from front to rear of said support, a stationary contact and a cooperating movable contact carried by said support, said movable support being biased to an open circuit position, a thermally actuated element carried by the support, a frame secured to said support and having ears projecting into said passage, a finger lever pivotally carried by said ears, an oscillating member pivotally carried by and restricted in its movement by said ears, a latching member pivotally carried by said oscillating member and free to move on occurrence of an overload in the circuit, one end of said latching member being held by said thermally actuated element under normal circuit conditions and adapted to be released by the action of the thermally actuated element upon an overload condition, the other end of said latching member coacting with the movable contact so that the movable contact may be moved by the action of the finger lever to open and close the circuit.

10. In a snap switch, a stationary contact, a movable contact cooperating therewith and normally biased in an off position, an oscillating member, a finger lever connected to the oscillating member, a throwing spring interposed between said finger lever and said oscillating member, a latching member mounted on said oscillating member and coacting with the movable switch element to operate the same when the finger lever is manually operated to open and close the circuit, and a thermally actuated member holding said latching member under normal load circuit conditions and adapted to release said latching member on an overload condition, said spring actuating the oscillating member when the thermally actuated element releases the latching member and said spring also actuating the oscillating member when the finger lever starts the oscillating member.

11. A snap switch construction of the manual and automatic overload type, including a stationary contact, a movable contact cooperating therewith and normally biased to the open circuit position, an operating unit including a finger lever, an oscillating member connected thereto, a combined cam and latching member pivotally mounted on and carried by said oscillating member and serving to hold the movable contact in the closed circuit position and free to move on occurrence of an overload in the circuit, a thermally actuated element holding said latching member under normal circuit conditions and adapted to be released upon an overload condition and a throwing spring interposed between said finger lever and said oscillating member for opening said switch with a snap action during normal circuit conditions and also for opening the switch with a snap action on an overload condition.

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